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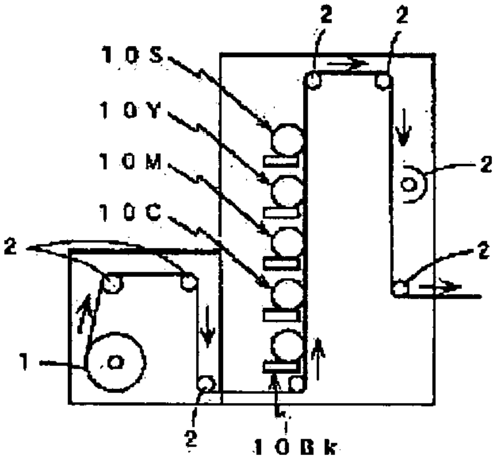
(54) TONER FOR NON-CONTACT THERMAL FIXING

(57)Abstract:
PROBLEM TO BE SOLVED: To fully fix toner for non-contact thermal fixing to a recording medium, even if the amount of an infrared absorbent is set small, to reduce production cost for toner, to restrain fluctuations of the electrification performance of the toner and the change of the color of color toner, and to obtain color image of superior reproducibility of color.
SOLUTION: For the toner for non-contact thermal fixing used for a full color image forming device, in which the toner is fixed on a recording medium 2 by a non-contact thermal fixing device 20, the infrared absorbent is stuck to the surfaces of toner particles, within the range of 0.1 to 1.5 pts.wt. with respect to the 100 pts.wt. of the toner particles.



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CLAIMS

[Claim(s)]

[Claim 1] The toner for non-contact heating fixing which is a toner for non-contact heating fixing used for the full color image formation equipment which fixes a toner on a record medium with non-contact heating fixing equipment, and is characterized by making the front face of a toner particle fix an infrared-absorption agent in the range of the 0.1 - 1.5 weight section to this toner particle 100 weight section.

[Claim 2] The toner for non-contact heating fixing which is the range the volume mean particle diameter Dv of whose is 3-9 micrometers, and is characterized by the ranges of the ratio (Dv/Dp) of the volume mean particle diameter Dv to the number mean particle diameter Dp being 1.0-1.25 in the toner for non-contact heating fixing according to claim 1.

[Claim 3] The toner for non-contact heating fixing with which the degree of mean-circle form is characterized by the standard deviation of 0.955 or more and the degree of mean-circle form being 0.040 or less in the toner for non-contact heating fixing according to claim 1 or 2.

[Claim 4] The toner for non-contact heating fixing to which the granulation of the above-mentioned toner particle is carried out by wet granulation, and it is characterized by the bird clapper by it in the toner for non-contact heating fixing given in any 1 term of claims 1-3.

[Claim 5] The toner for non-contact heating fixing with which the above-mentioned infrared-absorption agent is characterized by being a dithiol system nickel complex in the toner for non-contact heating fixing given in any 1 term of claims 1-4.

[Claim 6] The toner for non-contact heating fixing characterized by the toner for non-contact heating fixing given in any 1 term of claims 1-5 being except a black toner.

[Claim 7] In the toner for non-contact heating fixing given in any 1 term of claims 1-6, above non-contact heating fixing equipment is flash plate fixing equipment using the flash lamp, and the luminescence energy of this flash lamp is 2 3.0-7.0J/cm. Toner for non-contact heating fixing characterized by being a range.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the toner for non-contact heating fixing used for the full color image formation equipment which fixes a toner on a record medium with non-contact heating fixing equipment, and has the feature at the point which raised the fixing nature to the record medium of this toner for non-contact heating fixing.
[0002]
[Description of the Prior Art] In image formation equipments, such as a copying machine and a printer, in fixing to a record medium the toner supplied on the record medium, more various fixing equipments than before are used and non-contact heating fixing equipments, such as oven-fusing equipment and flash plate fixing equipment, were used as one sort of such fixing equipment.
[0003] And make heat and infrared radiation irradiate the toner supplied on the record medium, and you make a toner heat by this, and make it fixed to a record medium in the above non-contact heating fixing equipments.
[0004] Here, in the case of the black toner currently generally used conventionally, heat, carbon black with the high absorptivity of infrared radiation, etc. contain in the toner particle, and the record medium was fully fixed to the toner by the above non-contact heating fixing equipments.
[0005] However, in the case of the color toner which became colors other than black, the absorptivity of heat or infrared radiation is not enough. It is difficult to fully fix a color toner to a record medium with the above non-contact heating fixing equipments. Especially the thing for which it fully fixes to a record medium the color toner which the color toner of many amounts will be supplied on a record medium, and was supplied in this way in piling up the color toner of two or more colors and acquiring a full color picture was very difficult.
[0006] For this reason, in the former, into the toner particle in the above color toners, an infrared-absorption agent is made to contain, the absorptivity of heat or infrared radiation is raised, and raising the fixing nature to the record medium of such a color toner is performed.
[0007] In order to make an infrared-absorption agent contain in a toner particle as mentioned above and to fully raise the fixing nature to the record medium of a color toner here It was required to make the infrared-absorption agent of many amounts contain in a toner particle, and when the color toner of two or more colors is piled up and a full color picture is acquired especially, it is necessary to make [more / still] the amount of the infrared-absorption agent made to contain in a toner particle.
[0008] However, when it is made to make the infrared-absorption agent of many amounts contain in a toner particle in this way, while the manufacturing cost of a toner is attached highly An infrared-absorption agent is no longer distributed uniformly, and the problem of fogging occurring is in the picture which variation arises for the electrification performance of a toner and is formed, and the color in a color toner changes with these infrared-absorption agents. There were also problems, like the repeatability of the color in the obtained color picture becomes bad.
[0009]
[Problem(s) to be Solved by the Invention] This invention makes it a technical problem to solve above various problems in the toner for non-contact heating fixing used for the full color image formation equipment it was made to fix a toner on a record medium with non-contact heating fixing equipment.
[0010] Namely, it sets to the toner for non-contact heating fixing in this invention. Even if it is the color toner of colors other than black, while making it a record medium fully established by non-contact heating fixing equipment While being able to lessen the infrared-absorption agent used for raising the fixing nature of the toner for non-contact heating fixing and enabling it to reduce the manufacturing cost It suppresses that variation arises for the electrification

performance of a toner, it lessens that the color of a color toner changes with infrared-absorption agents further, and let it be a technical problem to obtain the color picture excellent in the repeatability of a color.
[0011]
[Means for Solving the Problem] In order to solve the above technical problems, it was made to make the front face of a toner particle fix an infrared-absorption agent in the range of the 0.1 - 1.5 weight section to this toner particle 100 weight section in this invention in the toner for non-contact heating fixing used for the full color image formation equipment which fixes a toner on a record medium with non-contact heating fixing equipment.
[0012] And like the toner for non-contact heating fixing in this invention, if it is made to make the front face of a toner particle fix an infrared-absorption agent In the front face of a toner particle, an infrared-absorption agent comes to absorb infrared radiation efficiently. Even if the absorption efficiency of the infrared radiation in this toner for non-contact heating fixing improves and it makes an infrared-absorption agent into the 0.1 - 1.5 weight section and a desirable amount with little range of the 0.2 - 1.3 weight section to the toner particle 100 weight section as mentioned above A record medium fully comes to be fixed to this toner for non-contact heating fixing by non-contact heating fixing equipment.
[0013] Moreover, since the amount of the infrared-absorption agent which makes the front face of a toner particle fix can be lessened in the toner for non-contact heating fixing in this invention, while the manufacturing cost of a toner is reduced, it is suppressed that properties, such as an electrification performance in a toner, fall, it decreases that the color of a color toner changes with infrared-absorption agents further, and the color picture excellent in the repeatability of a color comes to be obtained.
[0014] In the toner for non-contact heating fixing in this invention, with moreover, the diameter of a granule of the range the volume mean particle diameter Dv of whose is 3-9 micrometers If the ratio (Dv/Dp) of the volume mean particle diameter Dv to the number mean particle diameter Dp uses the toner with which the particle size which became the range of 1.0-1.25 gathered While being able to lessen the amount of the infrared-absorption agent which makes the front face of a toner particle fix and being able to raise the fixing nature to a record medium The variation in the electrification performance of a toner also comes to be suppressed, and what became the range whose volume mean particle diameter Dv is 4-8 micrometers more preferably is used.
[0015] In the toner for non-contact heating fixing in this invention the degree of mean-circle form furthermore, or more by 0.955 While raising the degree of sphericity so that the standard deviation of the degree of mean-circle form may become 0.040 or less If the configuration is arranged, the toner for non-contact heating fixing will be supplied in the dense state on a record medium, the thickness of the supplied toner will become thin, and infrared radiation will reach to the toner for non-contact heating fixing of a lower layer. A record medium fully comes to be established and the degree of mean-circle form uses more preferably that from which the standard deviation of 0.960 or more and the degree of mean-circle form became 0.035 or less.
[0016] And while being able to make circularity high in obtaining the toner for non-contact heating fixing in this invention to which particle size had gathered with the diameter of a granule as mentioned above, and the degree of sphericity was high and the configuration was equal, it is desirable to use the toner particle which carried out the granulation by the wet agglomeration method for the ability to also perform control of particle size easily.
[0017]
[Embodiments of the Invention] Hereafter, the toner for non-contact heating fixing concerning the operation form of this invention is explained concretely.
[0018] Here, in obtaining a toner particle in the toner for non-contact heating fixing in this operation form, a well-known binder resin, various kinds of well-known coloring agents, etc. which are generally used conventionally can be used.
[0019] And it is desirable to use a polyester system resin from points, such as the endurance of a resin and a translucency, as a binder resin used for this toner particle, for example, although a styrene-acrylic resin, a polyester system resin, an epoxy system resin, etc. can be used.
[0020] Moreover, it is made to correspond to the color of the toner for non-contact heating fixing, chooses suitably, and is made to use about a coloring agent.
[0021] It sets to the toner for non-contact heating fixing of yellow here. As a yellow coloring agent, for example, the yellow pigment of the C.I. pigment yellow 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 23, 65, 73, 83, and 180, the C.I. bat yellow 1 and 3, and 20 grades, C. The yellow color of I. solvent yellow 79,162 grade etc. can be used.
[0022] Moreover, it sets to the toner for non-contact heating fixing of a Magenta. As a Magenta coloring agent, for example C. I. pigment red 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 30, 31, 32, 37, 38, 39, 40, 41, 48, 49, 50, 51, 52, 53, 54, 55, and 57, The Magenta pigment of 58, 60, 63, 64, 68, 81, 83, 87, 88, 89, 90, 112, 114, 122, 123, 163, 184, 202, 206, 207, and 209 grades, C. I. solvent red 1, 3, 8, 23, 24, 25, 27, 30, 49, 81, 82, 83,

84, 100, 109, and 121, the C.I. De Dis Perth red 9, C.I. basic red 1, 2, 9, 12, 13, 14, 15, 17, 18, 22, 23, and 24, The Magenta color of 27, 29, 32, 34, 35, 36, 37, 38, 39, and 40 grades etc. can be used.

[0023] Moreover, in the toner for non-contact heating fixing of cyanogen, the cyano pigment of the C.I. pigment blues 2, 3, 15, and 16 and 17 grades etc. can be used as a cyano coloring agent.

[0024] Moreover, in the toner for non-contact heating fixing of black, carbon black, activated carbon, titanium black, magnetic powder, etc. can be used as a black coloring agent.

[0025] Moreover, in the toner for non-contact heating fixing of red, red ocher, cadmium red, minium, mercury sulfide, cadmium NIUMU, Permanent-Red 4R, Lithol-Red, pyrazolone red, Watchung-Red, calcium salt, Lake-Red D, brilliant carmin 6B, eosine lake, rhodamine lake B, alizarin lake, and brilliant-carmine 3B etc. can be used as a red coloring agent.

[0026] Moreover, in the toner for non-contact heating fixing of green, a chrome green, a chrome oxide, the pigment green B, a mica light green lake, the final yellow green G, etc. can be used as a green coloring agent.

[0027] Moreover, in the blue toner for non-contact heating fixing, the partial chlorination object of Berlin blue, cobalt blue, an alkali-blue lake, a copper phthalocyanine blue, a non-metal copper phthalocyanine blue, and a copper phthalocyanine blue, a Fast Sky Blue, and an INDA Indanthrene blue BC grade can be used as a blue coloring agent.

[0028] Moreover, in the toner for non-contact heating fixing in this operation form, it can also use as a transparent toner without making a toner particle add the above coloring agents. In addition, it is desirable to make such a transparent toner contain the infrared luminescence fluorescence material of colorlessness, white, or light color.

[0029] Moreover, you may make a toner particle contain an electric charge control agent and a wax if needed in the toner for non-contact heating fixing in this operation form.

[0030] And in the toner for non-contact heating fixing in this operation form, the kneading-grinding method, a wet agglomeration method, etc. which are generally used can be used in manufacturing a toner particle.

[0031] Moreover, as mentioned above, or more by 0.955, in case the degree of sphericity from which the standard deviation of the degree of mean-circle form became 0.040 or less obtains the toner for non-contact heating fixing with which it was high with the toner and the configuration gathered, the surface treatment of the toner particle manufactured by the kneading-grinding method is carried out with the surface-treatment equipment of dry process or a wet method, it is made to make it globular-form-ize, or the degree of mean-circle form obtains a toner particle by the wet agglomeration method.

[0032] Here, as a wet agglomeration method, a suspension-polymerization method, an emulsion-polymerization method, the emulsion-polymerization meeting method, a soap free emulsion-polymerization method, a non-moisture powder polymerization method, an in-situ polymerization method, interfacial polymerization, an emulsification distribution granulation method, etc. can use.

[0033] With moreover, the diameter of a granule of the range whose volume mean particle diameter Dv of a toner particle is 3-9 micrometers as mentioned above In case the ratio (Dv/Dp) of the volume mean particle diameter Dv to the number mean particle diameter Dp of this toner particle obtains the toner particle to which the particle size which became the range of 1.0-1.25 was equal It is made like [controlling appropriately the classification conditions on which the toner particle manufactured by the kneading-grinding method is made to classify by the classifier], or is made to make the conditions which manufacture a toner particle control by the wet agglomeration method appropriately.

[0034] Here, if the equipment which can carry out [globular form]-izing of the toner particles, such as a tape Rex type classifier (Hosokawa Micron CORP. make), is used as a classifier which classifies the toner particle manufactured by the kneading-grinding method, it can perform controlling the circularity in a toner etc. easily.

[0035] And it is made to make the front face of the above toner particles fix an infrared-absorption agent in the range of the 0.1 - 1.5 weight section to the toner particle 100 weight section in the toner for non-contact heating fixing in this operation form.

[0036] If it makes it hit in this way that the front face of a toner particle fixes an infrared-absorption agent, the front face of a toner particle can be made to fix an infrared-absorption agent here using surface-treatment equipment. In addition, about the toner particle manufactured by the kneading-grinding method, it is possible to also make the front face of this toner particle fix an infrared-absorption agent together with carrying out the surface treatment of the toner particle with surface-treatment equipment, and making it globular-form-ize as mentioned above.

[0037] As such surface-treatment equipment, for example And a Sir fusing system (Japanese pneumatic industrial company make), A hybridization system (the Nara machine factory company make), creep TRON KOSUMO series (Kawasaki Heavy Industries, Ltd. make), The surface-treatment equipment which gave a shock into high-speed flows, such as an INOMAIZA system (Hosokawa Micron CORP. make) The surface-treatment equipment adapting the dry-type mechanochemical methods, such as a mechano fusion system (Hosokawa Micron CORP. make) and a mechano mill (Okada elaborate company make) It can be used combining suitably the surface-treatment equipment adapting the method of coating wet [of a dace spar coat (the Nissin Food Products engineering company make) and a coat mizer (Freund Industrial make)] etc.

[0038] As an infrared-absorption agent which makes the front face of a toner particle fix here A well-known infrared-absorption agent can be used. For example, a cyanine compound, A merocyanine compound, a benzene thiol system metal complex, a mercapto phenol system metal complex, An aromatic diamine system metal complex, a G MONIUMU compound, an aminium compound, A nickel complex compound, a phthalocyanine system compound, an anthraquinone system compound, a naphthalocyanine system compound, etc. can be used. specifically A metal complex system infrared-absorption agent (130 Mitsui Chemicals, Inc. make : SIR- SIR132), Screw (dithio benzyl) nickel (green chemistry company make : MIR- 101), Screw [1, 2-screw (p-methoxypheny) -1, and 2-ethylene dithio rate] nickel (green chemistry company make : MIR- 102), Tetrapod-n-butyl ammonium screw (cis--1, 2-diphenyl -1, 2-ethylene dithio rate) nickel (green chemistry company make : MIR- 1011), Tetrapod-n-butyl ammonium screw [1, 2-screw (p-methoxypheny) -1, and 2-ethylene dithio rate] nickel (green chemistry company make : MIR- 1021), Screw (4-tert-1, 2-butyl -1, 2-dithio phenolate) nickel-tetrapod-n-butyl ammonium (Sumitomo Seika Chemicals Co., Ltd. make : BBDT-NI), A cyanine system infrared-absorption agent (Fuji Photo Film make : IRF- 106, IRF- 107), A mineral salt system infrared-absorption agent (imperial chemistry industrial company make : NIR-AM1), a potato NIUMU compound (Japan Carlit Co., Ltd. make : CIR- 1080, CIR- 1081), An aminium compound (Japan Carlit Co., Ltd. make : CIR- 960, CIR- 961), An anthraquinone system compound (Nippon Kayaku Co., Ltd. make : IR- 750), an aminium system compound (Nippon Kayaku Co., Ltd. make : inter-record-gap- 002, inter-record-gap- 003), A poly methine system compound (Nippon Kayaku Co., Ltd. make : IR- 820B), a G MONIUMU system compound (Nippon Kayaku Co., Ltd. make : inter-record-gap- 022, inter-record-gap- 023), A JIANIN compound (Nippon Kayaku Co., Ltd. make : CY- 2, CY- 4, CY- 9), a fusibility phthalocyanine (NIPPON SHOKUBAI Co., Ltd. make : TX- 305A), etc. can be used. Moreover, since the absorption coefficient of infrared radiation is light color highly also in these, it is desirable to use a dithiol system nickel complex.

[0039] Next, the full color image formation equipment which the toner for non-contact heating fixing concerning the above operation gestalten is fixed on a record medium with non-contact heating fixing equipment, and forms a full color picture is concretely explained based on an accompanying drawing.

[0040] In the full color image formation equipment shown in drawing 1 here In the one side side of the record medium 1 which sends the record medium 1 rolled in the shape of a roll with each delivery roller 2, and is sent in this way the 1st unit for image formation which supplies a black toner to a record medium 1 towards a downstream from the improvement style side in how to send this record medium 1 -- 10 Bk 2nd unit 10for image formation C which supplies the toner of a cyano color to a record medium 1, the object for the 3rd image formation which supplies the toner of a MAZENDA color to a record medium 1 -- the object for the 5th image formation which supplies unit 10M and 4th unit 10for image formation Y which supply a yellow toner to a record medium 1, and a transparent toner to a record medium 1 -- it has prepared in order of unit 10S

[0041] and the 1- of the above [side / one side / of the record medium 1 sent with the delivery roller 2 as mentioned above] -- each object for the 5th image formation -- each above-mentioned toner is supplied to a respectively suitable position from unit 10Bk, and 10C, 10M, 10Y and 10S, and it is made to form a full color toner image in the one side side of a record medium 1 continuously

[0042] And it leads to the flash plate fixing equipment 20 using flash lamps, such as a xenon lamp, with a roller 2, and the record medium 1 with which the full color toner image was formed in this way succeeding the one side side is sent, and it is made irradiate infrared radiation to the full color toner image formed in one side of a record medium 1 from this flash plate fixing equipment 20, and to fix a full color toner image to a record medium 1 by this infrared radiation.

[0043] here above-mentioned the 1- each object for the 5th image formation -- the toner in unit 10Bk, and 10C, 10M, 10Y and 10S -- especially -- the 2- like the toner for non-contact heating fixing in the aforementioned operation form to the toner in each 5th unit 10C, 10M, 10Y, and 10S for image formation [if the toner which made the front face of a toner particle fix an infrared-absorption agent in the range of the 0.1 - 1.5 weight section to the toner particle 100 weight section is used, when each toner will fix a full color toner image to a record medium 1 in piles] A record medium 1 fully comes to be fixed to a full color toner image by above flash plate fixing equipment 20.

[0044] It is the luminescence energy of the above-mentioned flash lamp in order to make it a record medium 1 fully fixed to a full color toner image, lessening power consumption here in fixing a full color toner image to a record medium 1 with the flash plate fixing equipment 20 using the flash lamp as mentioned above 3.0 - 7.0 J/cm2 It is desirable to make it the range.

[0045] in addition, the one side side of the record medium 1 sent with the delivery roller 2 in the full color image formation equipment shown in drawing 1 -- the 1- each object for the 5th image formation, although unit 10Bk, and

10C, 10M, 10Y and 10S were only prepared Unit 10Bk, and 10C, 10M, 10Y and 10S are prepared. both-sides side of the record medium 1 sent with the delivery roller 2 as shown in drawing 2 -- respectively -- the 1- each object for the 5th image formation -- While forming a full color toner image in both sides of a record medium 1 continuously The above flash plate fixing equipment 20 using the flash lamp is formed in both-sides side of a record medium 1. It is also possible to irradiate infrared radiation to the full color toner image formed in both sides of a record medium 1 from the flash plate fixing equipment 20 in these both sides, and to make it fix a full color toner image to both sides of a record medium 1 by this infrared radiation.

[0046]

[Example] Next, while explaining concretely the toner for non-contact heating fixing concerning the example of this invention, when a full color picture is acquired using the toner for non-contact heating fixing concerning the example of this invention, with the flash plate fixing equipment using the xenon lamp etc., the example of comparison is given and it is shown clearly that a record medium fully comes to be fixed to a full color toner image.

[0047] (Yellow toner Y1) In manufacturing the yellow toner Y1, the polyester system resin obtained as follows was used.

[0048] First, as the mole ratio became the rate of 3:7:9 about polyoxypropylene (2.2) -2, 2-screw (4-hydroxyphenyl) propane, a polyoxyethylene (2.0) -2 and 2-screw (4-hydroxyphenyl) propane, and the terephthalic acid, these were put in in glass 4 mouth flask which attached the dibutyl tin oxide of a polymerization initiator, the stirring rod of the product made from a hygrometer and stainless steel together and a flowing-down formula capacitor, and the nitrogen introduction pipe.

[0049] And having set this 4 mouth flask into the mantle heater, and introducing nitrogen in this flask from the above-mentioned nitrogen introduction pipe, carry out heating churning and it was made to react, when the reaction state was pursued and the predetermined acid number was reached, measuring the acid number in this reaction, the reaction was ended, respectively, this was cooled, and the polyester system resin was obtained.

[0050] And for 4.2 and the glass transition temperature (Tg), 68.5 degrees C and softening temperature (Tm) were [number average molecular weight (Mn) / 3300, and weight-average-molecular-weight (Mw) / number average molecular weight (Mn) / 110.3 degrees C and the acid number of the physical properties of the polyester system resin which carried out in this way and was obtained] 3.3 KOHmg/g and water acid-number 28.1 KOHmg/g. Here, about the glass transition temperature (Tg), using the differential scanning calorimeter (SEIKO electronic company make : DSC- 200), the alumina was used for the reference, the 10mg sample was measured among 20-120 degrees C on condition that 10 degrees C of programming rates, and min, and the shoulder value of the main endothermic peaks was made into the glass transition point. Moreover, about softening temperature (Tm), the dice whose length the diameter of pore is 1mm and is 1mm is used using a flow tester (Shimadzu Corp. make : CFT- 500), and it is 2 1cm under pressure 20 kg/cm2, 6 degrees C of programming rates, and the conditions of min. Temperature which flows out of the defluxion start point when carrying out melting defluxion of the sample, and is equivalent to one half of the height of an ending point was made into softening temperature. Moreover, about the acid number, the 10mg sample was dissolved in toluene 50ml, and it computed using the mixed indicator of 0.1% of prom thymol blue, and a Phenol Red from the consumption of N / 10 potassium hydroxides / alcoholic solution conferred beforehand. Moreover, mg of a potassium hydroxide required to process the sample by which weighing capacity was carried out by the acetic anhydride, understand the obtained acetyl compound an added water part, and neutralize the separating acetic acid showed the water acid number.

[0051] In using the polyester system resin obtained as mentioned above, coarse grinding of this polyester system resin is carried out, and it was made for particle size to be set to 1mm or less here.

[0052] And this polyester system resin and C.I. pigment yellow of a yellow coloring agent After having taught 180 (product made from clear RANTO) to the pressurized kneader as it became the weight ratio of 7:3, and kneading it at 120 degrees C for 1 hour, this was cooled, coarse grinding was carried out with the hammer mill after that, and the pigment masterbatch from which the content of a yellow coloring agent became 30wt(s)% was obtained.

[0053] subsequently, the above-mentioned polyester system resin 100 weight section -- receiving -- C.I. pigment yellow of a yellow coloring agent It was fully mixed, having applied [as 7 weight sections are comparatively alike and 180 became, it put an above-mentioned polyester system resin and an above-mentioned pigment masterbatch into the Henschel mixer, and] these for 180 seconds by peripheral-speed 40 m/sec by the Henschel mixer.

[0054] And melting kneading of this mixture was carried out with the biaxial knockout kneading machine (Ikegai Corp. make-CM- 30), and after rolling out this kneading object in thickness of 2mm by the press roller and cooling with a cooling belt, coarse grinding of this was carried out with the feather mill. Then, after the mechanical grinder's (Kawasaki Heavy Industries, Ltd. make's :'s KTM's) having ground this and grinding by the jet pulverizer (Japanese pneumatic industrial company make : IDS) further, it classified using the Rota type classifier (Hosokawa Micron

CORP. make : tape Rex type classifier 100ATP), and the toner particle of yellow was obtained.

[0055] Thus, the volume mean particle diameter of the toner particle of the obtained yellow was [the standard deviation of 0.954 and circularity of 7.2 micrometers and the degree of mean-circle form of those] 0.041.

[0056] As opposed to the toner particle 100 weight section of this yellow a dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) as an infrared-absorption agent Subsequently, the 0.5 weight section, A hydrophobic silica (Wacker make : H2000) is made into the rate of the 0.5 weight section. After mixing these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it processed for 3 minutes by 16400rpm by the hybridization system (the Nara machine factory company make : NHS- 0 type), and fixed processing of the infrared-absorption agent was carried out on the front face of the above-mentioned toner particle.

[0057] Subsequently, the toner particle 100 weight section which carried out fixed processing of the infrared-absorption agent in this way is received. The 0.2 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) for a hydrophobic silica (Wacker make : H2000) The 0.5 weight section, After the mean particle diameter added the strontium titanate which is 0.2 micrometers at a rate of the 1.0 weight section and carried out mixed processing of these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it trembled by the screen of 90 micrometers of openings, and the yellow toner Y1 was obtained.

[0058] In addition, as this yellow toner Y1 was shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to 7.3 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv] Dv, 1.24 and the degree of mean-circle form was [the standard deviation (circularity SD) of 0.962 and circularity] 0.036.

[0059] Here, the above-mentioned volume mean particle diameter Dv and the above-mentioned number mean particle diameter Dp were measured using the 50-micrometer aperture tube using the coal tar multi-sizer II (Coulter-counter company make).

[0060] Moreover, about the standard deviation (circularity SD) of the degree of mean-circle form, and circularity, using flow formula particle image analysis equipment (product made from cis-MEKKU : FPIA- 2000), it asked for the boundary length of the projection image of a particle, and the boundary length of a circle equal to the projected area of this toner particle by the moisture powder system, and circularity was computed and it asked for the standard deviation (circularity SD) of the degree of mean-circle form, and circularity based on this by the following formula.

[0061] Circularity = the boundary length of the projection image of the boundary length / toner particle of a circle equal to the projected area of a toner particle [0062] (Yellow toners Y2, Y3, and Y4) In manufacturing the yellow toners Y2, Y3, and Y4 In manufacture of the above-mentioned yellow toner Y1, it hits carrying out fixed processing of the above-mentioned infrared-absorption agent by the hybridization system on the front face of the toner particle of the above-mentioned yellow. As only the amount of the infrared-absorption agent made to add to the toner particle 100 weight section is changed and it is shown in the following table 1 The amount of an infrared-absorption agent was made into the 1.2 weight section with the 0.8 weight section and the yellow toner Y4 with the 0.2 weight section and the yellow toner Y3 at the yellow toner Y2, and the yellow toners Y2, Y3, and Y4 were manufactured like the case of the above-mentioned yellow toner Y1 except it.

[0063] As shown in the following table 1, in addition, the above-mentioned yellow toner Y2 For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv] Dv, 1.23 and the degree of mean-circle form is [the standard deviation (circularity SD) of 0.961 and circularity] 0.036. For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / yellow / Y3 / above-mentioned] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.22 and the degree of mean-circle form is / the standard deviation (circularity SD) of 0.962 and circularity / 0.035. For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / yellow / Y4 / above-mentioned] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.23 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.961 and circularity / 0.036.

[0064] (Yellow toner y**, y**) In manufacturing yellow toner y** and y** In manufacture of the above-mentioned yellow toner Y1, it hits carrying out fixed processing of the above-mentioned infrared-absorption agent by the hybridization system on the front face of the toner particle of the above-mentioned yellow. As only the amount of the infrared-absorption agent made to add to the toner particle 100 weight section is changed and it is shown in the following table 1 It is made not to add an infrared-absorption agent, and at yellow toner y**, by yellow toner y**, the amount of an infrared-absorption agent was made into 2 weight sections, and yellow toner y** and y** were manufactured like the case of the above-mentioned yellow toner Y1 except it.

[0065] As shown in the following table 1, in addition, above yellow toner y** For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to 7.6 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv] Dv, 1.27 and the degree of mean-circle form is [the standard deviation (circularity SD) of 0.954 and circularity] 0.041. For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / ** / yellow toner y/ above] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.23 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.960 and circularity / 0.038.

[0066] (Yellow toner Y5) In manufacturing the yellow toner Y5 In carrying out fixed processing of the above-mentioned infrared-absorption agent on the front face of the toner particle of the above-mentioned yellow in manufacture of the above-mentioned yellow toner Y1 the same as the case of the yellow toner Y1 in the amount of the infrared-absorption agent to the above-mentioned toner particle 100 weight section, while carrying out the 0.5 weight section It replaced with the above-mentioned hybridization system, and using the Sir fusing system 3 type (Japanese pneumatic industrial company make), it heat-treated at the moment at the temperature of 280 degrees C, and the yellow toner Y5 was manufactured like the case of the above-mentioned yellow toner Y1 except it.

[0067] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / yellow / Y5 / this] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.18 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.976 and circularity / 0.033.

[0068] (Yellow toner Y6) In manufacturing the yellow toner Y6 In obtaining the toner particle of the above-mentioned yellow in manufacture of the above-mentioned yellow toner Y1 The kneading object which carried out melting kneading with the above-mentioned biaxial knockout kneading machine (Ikegai Corp. make-CM- 30) is rolled out in thickness of 2mm by the press roller. The ** which does not grind this kneading object with a mechanical grinder (Kawasaki Heavy Industries, Ltd. make : KTM) after cooling with a cooling belt and carrying out coarse grinding with a feather mill, It ground by the jet pulverizer (Japanese pneumatic industrial company make : IDS) immediately, it classified using the elbow jet type classifier (Japanese ironworker business company make : EJ- 0 type), and the toner particle of yellow was obtained.

[0069] And the toner particle 100 weight section of the yellow which carried out in this way and was obtained is received. As an infrared-absorption agent, are made a dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) into the 0.5 weight section, and a hydrophobic silica (Wacker make : H2000) is made into the rate of the 0.5 weight section. After mixing these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, It processed for 1 minute by 10000rpm by the hybridization system (the Nara machine factory company make : NHS- 0 type), and the yellow toner Y6 was manufactured like the case of the above-mentioned yellow toner Y1 except it.

[0070] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / yellow / Y6 / this] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.25 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.955 and circularity / 0.039.

[0071] (Yellow toner y**) In manufacturing yellow toner y** In manufacture of the above-mentioned yellow toner Y1, the above-mentioned polyester system resin 100 weight section is received. C.I. pigment yellow of a yellow coloring agent It is made for the dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) of 7 weight sections and an infrared-absorption agent to become [180] the rate of the 0.5 weight section. A polyester system resin, an above-mentioned pigment masterbatch, and an above-mentioned infrared-absorption agent were put into the Henschel mixer, it applied for 180 seconds by peripheral-speed 40 m/sec by this Henschel mixer, and these were fully mixed.

[0072] And melting kneading of this mixture is carried out with a biaxial knockout kneading machine (Ikegai Corp. make-CM- 30). After rolling out this kneading object in thickness of 2mm by the press roller and cooling with a cooling belt, After carrying out coarse grinding of this with a feather mill, this was ground by the jet pulverizer (Japanese pneumatic industrial company make : IDS), it classified using the elbow jet type classifier (Japanese ironworker business company make : EJ- 0 type), and the toner particle of the yellow which the infrared-absorption agent contained was obtained.

[0073] Subsequently, after adding the strontium titanate the 0.5 weight section and whose mean particle diameter are 0.2 micrometers in a hydrophobic silica (Wacker make : H2000) about the 0.2 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) at a rate of the 1.0 weight section and carrying out mixed processing of these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer to the toner particle 100 weight section of this yellow, it trembled by the screen of 90 micrometers of openings, and yellow toner y** was obtained.

[0074] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / ** / yellow toner y/ this] 7.3 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.31 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.942 and circularity / 0.043.

[0075] (Cyano toner C1) In manufacturing the cyano toner C1 The same polyester system resin as the case of the above-mentioned yellow toner Y1 is used. This polyester system resin, After teaching the C.I. pigment blue 15-3 (Dainippon Ink make) of a cyano coloring agent to a pressurized kneader as it becomes the weight ratio of 7:3, and kneading it at 120 degrees C for 1 hour, cool this and coarse grinding is carried out with a hammer mill after that. The pigment masterbatch from which the content of a cyano coloring agent became 30wt(s)% was obtained.

[0076] and it was fully mixed to the above-mentioned polyester system resin 100 weight section, having applied [as 5 weight sections are comparatively alike and the C.I. pigment blue 15-3 of a cyano coloring agent became, it put an above-mentioned polyester system resin and an above-mentioned pigment masterbatch into the Henschel mixer, and] these for 180 seconds by peripheral-speed 40 m/sec by the Henschel mixer

[0077] Subsequently, melting kneading of this mixture was carried out with the biaxial knockout kneading machine (Ikegai Corp. make-CM- 30), and after rolling out this kneading object in thickness of 2mm by the press roller and cooling with a cooling belt, coarse grinding of this was carried out with the feather mill. Then, after the mechanical grinder's (Kawasaki Heavy Industries, Ltd. make's :'s KTM's) having ground this and grinding by the jet pulverizer (Japanese pneumatic industrial company make : IDS) further, it classified using the Rota type classifier (Hosokawa Micron CORP. make : tape Rex type classifier 100ATP), and the toner particle of cyanogen was obtained.

[0078] As opposed to the toner particle 100 weight section of this cyanogen a dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) as an infrared-absorption agent Subsequently, the 0.5 weight section, A hydrophobic silica (Wacker make : H2000) is made into the rate of the 0.5 weight section. After mixing this for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it processed for 3 minutes by 16400rpm by the hybridization system (the Nara machine factory company make : NHS- 0 type), and fixed processing of the infrared-absorption agent was carried out on the front face of the above-mentioned toner particle.

[0079] And the toner particle 100 weight section which carried out fixed processing of the infrared-absorption agent in this way is received. The 0.2 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) for a hydrophobic silica (Wacker make : H2000) The 0.5 weight section, After the mean particle diameter added the strontium titanate which is 0.2 micrometers at a rate of the 1.0 weight section and carried out mixed processing of these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it trembled by the screen of 90 micrometers of openings, and the cyano toner C1 was obtained.

[0080] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / cyano / C1 / this] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.23 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.961 and circularity / 0.036.

[0081] (Cyano toner c**, c**) In manufacturing cyano toner c** and c** As only the amount of the infrared-absorption agent which the front face of the toner particle of the above-mentioned cyanogen is made to add to the toner particle 100 weight section in manufacture of the above-mentioned cyano toner C1 in carrying out fixed processing of the infrared-absorption agent is changed and it is shown in the following table 1 It is made not to add an infrared-absorption agent, and at cyano toner c**, by cyano toner c**, the amount of an infrared-absorption agent was made into 2 weight sections, and cyano toner c** and c** were manufactured like the case of the above-mentioned cyano toner C1 except it.

[0082] As shown in the following table 1, in addition, above cyano toner c** For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to 7.7 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv] Dv, 1.28 and the degree of mean-circle form is [the standard deviation (circularity SD) of 0.953 and circularity] 0.041. Moreover, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / ** / cyano toner c/ above] 7.3 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.24 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.959 and circularity / 0.038.

[0083] (Cyano toner C2) In manufacturing the cyano toner C2 In carrying out fixed processing of the above-mentioned infrared-absorption agent on the front face of the toner particle of the above-mentioned cyanogen in manufacture of the above-mentioned cyano toner C1 While making the amount of the infrared-absorption agent to the above-mentioned toner particle 100 weight section into the 0.5 same weight section as the case of the cyano toner C1 It replaced with the above-mentioned hybridization system, and heat-treated at the moment at the temperature of 280 degrees C using the Sir fusing system 3 type (Japanese pneumatic industrial company make), and the cyano toner C2 was manufactured like the case of the above-mentioned cyano toner C1 except it.

[0084] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / cyano / C2 / this] 7.1 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.17 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.975 and circularity / 0.032.

[0085] (Cyano toner C3) In manufacturing the cyano toner C3 In obtaining the toner particle of cyanogen in manufacture of the above-mentioned cyano toner C1 The kneading object which carried out melting kneading with the above-mentioned biaxial knockout kneading machine (Ikegai Corp. make-CM- 30) is rolled out in thickness of 2mm by the press roller. The ** which does not grind this kneading object with a mechanical grinder (Kawasaki Heavy Industries, Ltd. make : KTM) after cooling with a cooling belt and carrying out coarse grinding with a feather mill, It ground by the jet pulverizer (Japanese pneumatic industrial company make : IDS) immediately, it classified using the elbow jet type classifier (Japanese ironworker business company make : EJ- 0 type), and the toner particle of cyanogen was obtained.

[0086] And the toner particle 100 weight section of the cyanogen which carried out in this way and was obtained is received. As an infrared-absorption agent, are made a dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) into the 0.5 weight section, and a hydrophobic silica (Wacker make : H2000) is made into the rate of the 0.5 weight section. After mixing these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, It processed for 1 minute by 10000rpm by the hybridization system (the Nara machine factory company make : NHS- 0 type), and the cyano toner C3 was manufactured like the case of the above-mentioned cyano toner C1 except it.

[0087] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / cyano / C3 / this] 7.3 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.24 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.955 and circularity / 0.038.

[0088] (Cyano toner c**) In manufacturing cyano toner c** In manufacture of the above-mentioned cyano toner C1, the above-mentioned polyester system resin 100 weight section is received. It is made for the dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) of 5 weight sections and an infrared-absorption agent to become [the C.I. pigment blue 15-3 of a cyano coloring agent] the rate of the 0.5 weight section. A polyester system resin, an above-mentioned pigment masterbatch, and an above-mentioned infrared-absorption agent were put into the Henschel mixer, it applied for 180 seconds by peripheral-speed 40 m/sec by this Henschel mixer, and these were fully mixed.

[0089] And melting kneading of this mixture is carried out with a biaxial knockout kneading machine (Ikegai Corp. make-CM- 30). After rolling out this kneading object in thickness of 2mm by the press roller and cooling with a cooling belt, After carrying out coarse grinding of this with a feather mill, this was ground by the jet pulverizer (Japanese pneumatic industrial company make : IDS), it classified using the elbow jet type classifier (Japanese ironworker business company make : EJ- 0 type), and the toner particle of the cyanogen which the infrared-absorption agent contained was obtained.

[0090] Subsequently, the ** which does not add an infrared-absorption agent to the toner particle 100 weight section of this cyanogen, The 0.2 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) for a hydrophobic silica (Wacker make : H2000) The 0.5 weight section, After the mean particle diameter added the strontium titanate which is 0.2 micrometers at a rate of the 1.0 weight section and carried out mixed processing of these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it trembled by the screen of 90 micrometers of openings, and cyano toner c** was obtained.

[0091] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / ** / cyano toner c/ this] 6.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.30 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.958 and circularity / 0.040.

[0092] (MAZENDA toner M1) In manufacturing the MAZENDA toner M1 The same polyester system resin as the case of the above-mentioned yellow toner Y1 is used. This polyester system resin, After teaching the C.I. pigment red 184 (Dainippon Ink make) of a MAZENDA coloring agent to a pressurized kneader as it becomes the weight ratio of 7:3, and kneading it at 120 degrees C for 1 hour, cool this and coarse grinding is carried out with a hammer mill after that. The pigment masterbatch from which the content of a MAZENDA coloring agent became 30wt(s)% was obtained.

[0093] and it was fully mixed to the above-mentioned polyester system resin 100 weight section, having applied [as the 4.5 weight sections are comparatively alike and the C.I. pigment red 184 of a MAZENDA coloring agent became, it put an above-mentioned polyester system resin and an above-mentioned pigment masterbatch into the Henschel mixer, and] these for 180 seconds by peripheral-speed 40 m/sec by the Henschel mixer

[0094] Subsequently, melting kneading of this mixture was carried out with the biaxial knockout kneading machine (Ikegai Corp. make-CM- 30), and after rolling out this kneading object in thickness of 2mm by the press roller and cooling with a cooling belt, coarse grinding of this was carried out with the feather mill. Then, after the mechanical grinder's (Kawasaki Heavy Industries, Ltd. make's :'s KTM's) having ground this and grinding by the jet pulverizer (Japanese pneumatic industrial company make : IDS) further, it classified using the Rota type classifier (Hosokawa

Micron CORP. make : tape Rex type classifier 100ATP), and the toner particle of MAZENDA was obtained.

[0095] As opposed to the toner particle 100 weight section of this MAZENDA a dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) as an infrared-absorption agent Subsequently, the 0.5 weight section, A hydrophobic silica (Wacker make : H2000) is made into the rate of the 0.5 weight section. After mixing these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it processed for 3 minutes in 16400rpm by the hybridization system (the Nara machine factory company make : NHS- 0 type), and fixed processing of the infrared-absorption agent was carried out on the front face of the above-mentioned toner particle.

[0096] And the toner particle 100 weight section which carried out fixed processing of the infrared-absorption agent in this way is received. The 0.2 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) for a hydrophobic silica (Wacker make : H2000) The 0.5 weight section, After the mean particle diameter added the strontium titanate which is 0.2 micrometers at a rate of the 1.0 weight section and carried out mixed processing of these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it trembled by the screen of 90 micrometers of openings, and the MAZENDA toner M1 was obtained.

[0097] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / MAZENDA / M1 / this] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.24 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.962 and circularity / 0.036.

[0098] (MAZENDA toner m**, m**) In manufacturing MAZENDA toner m** and m** In manufacture of the above-mentioned MAZENDA toner M1, it hits carrying out fixed processing of the infrared-absorption agent on the front face of the toner particle of above-mentioned MAZENDA. As only the amount of the infrared-absorption agent made to add to the toner particle 100 weight section is changed and it is shown in the following table 1 It is made not to add an infrared-absorption agent, and at MAZENDA toner m**, by MAZENDA toner m**, the amount of an infrared-absorption agent was made into 2 weight sections, and MAZENDA toner m** and m** were manufactured like the case of the above-mentioned MAZENDA toner M1 except it.

[0099] As shown in the following table 1, in addition, above MAZENDA toner m** For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to 7.7 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv] Dv, 1.28 and the degree of mean-circle form is [the standard deviation (circularity SD) of 0.954 and circularity] 0.042. Moreover, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / ** / MAZENDA toner m/ above] 7.3 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.24 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.961 and circularity / 0.037.

[0100] (MAZENDA toner M2) In manufacturing the MAZENDA toner M2 In carrying out fixed processing of the above-mentioned infrared-absorption agent on the front face of the toner particle of above-mentioned MAZENDA in manufacture of the above-mentioned MAZENDA toner M1 the same as the case of the MAZENDA toner M1 in the amount of the infrared-absorption agent to the above-mentioned toner particle 100 weight section, while carrying out the 0.5 weight section It replaced with the above-mentioned hybridization system, and heat-treated at the moment at the temperature of 280 degrees C using the Sir fusing system 3 type (Japanese pneumatic industrial company make), and the MAZENDA toner M2 was manufactured like the case of the above-mentioned MAZENDA toner M1 except it.

[0101] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / MAZENDA / M2 / this] 7.1 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.17 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.975 and circularity / 0.033.

[0102] (MAZENDA toner M3) In manufacturing the MAZENDA toner M3 In obtaining the toner particle of MAZENDA in manufacture of the above-mentioned MAZENDA toner M1 The kneading object which carried out melting kneading with the above-mentioned biaxial knockout kneading machine (Ikegai Corp. make-CM- 30) is rolled out in thickness of 2mm by the press roller. The ** which does not grind this kneading object with a mechanical grinder (Kawasaki Heavy Industries, Ltd. make : KTM) after cooling with a cooling belt and carrying out coarse grinding with a feather mill, It ground by the jet pulverizer (Japanese pneumatic industrial company make : IDS) immediately, it classified using the elbow jet type classifier (Japanese ironworker business company make : EJ- 0 type), and the toner particle of MAZENDA was obtained.

[0103] And the toner particle 100 weight section of MAZENDA which carried out in this way and was obtained is received. As an infrared-absorption agent, are made a dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) into the 0.5 weight section, and a hydrophobic silica (Wacker make : H2000) is made into the rate of the 0.5 weight section. After mixing these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, It processed for 1 minute in 10000rpm by the hybridization system (the Nara machine factory company make : NHS- 0 type), and the MAZENDA toner M3 was manufactured like the case of the above-mentioned MAZENDA toner M1 except it.

[0104] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / MAZENDA / M3 / this] 7.3 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.24 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.955 and circularity / 0.039.

[0105] (MAZENDA toner m**) In manufacturing MAZENDA toner m** In manufacture of the above-mentioned MAZENDA toner M1, the above-mentioned polyester system resin 100 weight section is received. It is made for the dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) of 5 weight sections and an infrared-absorption agent to become [the C.I. pigment blue 15-3 of a MAZENDA coloring agent] the rate of the 0.5 weight section. A polyester system resin, an above-mentioned pigment masterbatch, and an above-mentioned infrared-absorption agent were put into the Henschel mixer, it applied for 180 seconds by peripheral-speed 40 m/sec by this Henschel mixer, and these were fully mixed.

[0106] And melting kneading of this mixture is carried out with a biaxial knockout kneading machine (Ikegai Corp. make-CM- 30). After rolling out this kneading object in thickness of 2mm by the press roller and cooling with a cooling belt, After carrying out coarse grinding of this with a feather mill, this was ground by the jet pulverizer (Japanese pneumatic industrial company make : IDS), it classified using the elbow jet type classifier (Japanese ironworker business company make : EJ- 0 type), and the toner particle of MAZENDA which the infrared-absorption agent contained was obtained.

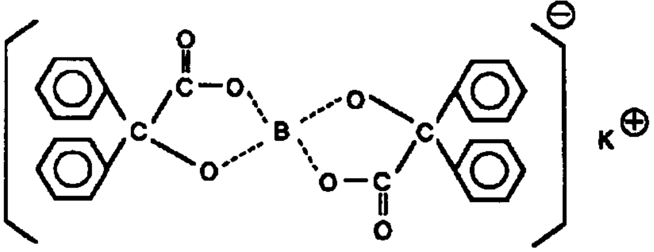
[0107] Subsequently, the ** which does not add an infrared-absorption agent to the toner particle 100 weight section of this MAZENDA, The 0.2 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) for a hydrophobic silica (Wacker make : H2000) The 0.5 weight section, After the mean particle diameter added the strontium titanate which is 0.2 micrometers at a rate of the 1.0 weight section and carried out mixed processing of these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it trembled by the screen of 90 micrometers of openings, and MAZENDA toner m** was obtained.

[0108] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / ** / MAZENDA toner m/ this] 6.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.29 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.961 and circularity / 0.040.

[0109] (Yellow toner Y7) In manufacturing the yellow toner Y7 The toluene 400 weight section is received using the same polyester system resin as the case of the above-mentioned yellow toner Y1. C.I. pigment yellow of the yellow coloring agent which became the shape of the 100 weight sections and a wet cake about this polyester system resin 180 (product made from clear RANTO) 7 weight sections, The boron compound shown in the formula (1) of following ** 1 was added at a rate of 1 weight section, these were mixed for 30 minutes with the ultrasonic homogenizer, and the coloring resin solution was obtained.

[0110]

[Formula 1]



(1)

[0111] the distribution which made the solution 1000 weight section which, on the other hand, contains the hydroxylation calcium phosphate which is a distributed stabilizer 4% of the weight carry out the 0.1 weight section dissolution of the sodium lauryl sulfate (Wako Pure Chem make) -- service water -- the solution was prepared

[0112] and this distribution -- service water -- while stirring the solution 00 weight section by 4200rpm by TK auto gay mixer (special opportunity-ized industrial company make) -- this distribution -- service water -- the above-mentioned coloring resin solution 50 weight section is dropped at a solution -- making -- the drop of a coloring resin solution -- distribution -- service water -- the solution was made to suspend

[0113] Subsequently, after making it dissolve by the concentrated sulfuric acid and removing the hydroxylation calcium phosphate contained in this coloring resin particle, this suspension was left under the conditions of 60 degrees C and 100mmHg for 5 hours, toluene was removed, the coloring resin particle was deposited, this was filtered, the operation which rinses was repeated and the toner particle of yellow was obtained.

[0114] And after fully distributing these in addition so that it may become the 0.5 weight section about the dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) of an infrared-absorption agent which came wet cake-like to the toner particle 100 weight section of the above-mentioned yellow into ethanol, it was made to dry at 75 degrees C with a slurry dryer (the Nissin Food Products engineering company make : dace spar coat), and the front face of the toner particle of yellow was made to fix an infrared-absorption agent.

[0115] Then, the toner particle 100 weight section of the yellow which the infrared-absorption agent fixed on the front face in this way is received. The 0.5 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) for a hydrophobic silica (Wacker make : H2000) The 0.5 weight section, After the mean particle diameter added the strontium titanate which is 0.2 micrometers at a rate of the 0.5 weight section and carried out mixed processing of these for 120 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it trembled by the screen of 90 micrometers of openings, and the yellow toner Y7 was obtained.

[0116] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / yellow / Y7 / this] 7.0 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.19 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.988 and circularity / 0.032.

[0117] (The cyano toner C4, MAZENDA toner M4) In manufacturing the cyano toner C4 and the MAZENDA toner M4 In manufacture of the above-mentioned yellow toner Y7, in obtaining a coloring resin solution, change the kind and amount of a coloring agent which are applied to the toluene 400 weight section, and it sets to the cyano toner C4. C. I. PIKUMENTO blue 15-3 (Dainippon Ink make) is set to the 5.0 weight sections and the MAZENDA toner M4. C. I. PIKUMEN tread 184 (Dainippon Ink make) is added at a rate of the 4.5 weight sections. except it The cyano toner C4 and the MAZENDA toner M4 with which 0.5 weight section fixing of the dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) of an infrared-absorption agent was carried out to the toner particle 100 weight section were manufactured like the case of the above-mentioned yellow toner Y7.

[0118] As shown in the following table 1, in addition, the cyano toner C4 For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to 6.9 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv] Dv, 1.18 and the degree of mean-circle form is [the standard deviation (circularity SD) of 0.989 and circularity] 0.031. Moreover, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / MAZENDA / M4] 7.0 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.18 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.988 and circularity / 0.032.

[0119] (Yellow toner Y8) In manufacturing the yellow toner Y8 Styrene in the reactor made from the stainless steel whose capacity is 100l. The 0.1 weight section, The 0.1 weight section and a methacrylic acid The 0.1 weight section, [n-butyl acrylate] It taught so that sodium dodecylbenzenesulfonate which is an emulsifier might become the 0.08 weight section and ion exchange water might become the rate of the 300 weight sections, this was heated at 75 degrees C, 0.05 weight section addition of the potassium persulfate was carried out, it applied to this in 1 hour, the polymerization was performed, and the water dispersion of a latex was obtained.

[0120] Furthermore, as the potassium persulfate the 77.7 weight sections and whose n-butyl acrylate are the 22.0 weight sections and a polymerization initiator became the rate of the 0.3 weight section, it added continuously, having applied these to the above-mentioned latex water dispersion in 4 hours, and the polymerization was performed, and styrene obtained the polymer particle from which the mean particle diameter was set to 0.15 micrometers.

[0121] The polymer particle whose above-mentioned mean particle diameter is 0.15 micrometers And the 187 weight sections, The yellow coloring agent (Clariant, LTD. make : C.I.Pigment Yellow180) which became wet cake-like 7 weight sections, A wax (Sanyo Chemical Industries, Ltd. make : low-molecular-weight-polypropylene 660 P) 5 weight sections, The boron compound shown in the aforementioned formula (1) become 1 weight section, and it is made for ion exchange water to become the rate of the 320 weight sections. It heated at 25 degrees C, agitating using TK auto gay mixer (special opportunity-ized industrial company make), after mixing this mixture for 30 minutes with an ultrasonic homogenizer, and the dispersion liquid of the aggregated particle from which the particle diameter was set to 1.2 micrometers were obtained.

[0122] Subsequently, after it heated to 60 degrees C after agitating the dispersion liquid of the above-mentioned aggregated particle for about 2 hours, and ammonia adjusted to pH 7.0, these dispersion liquid were heated to 90 more degrees C, and it agitated for 2 hours, and after obtaining the dispersion liquid of the coloring particle of the yellow from which the mean particle diameter was set to 6.5 micrometers and separating this coloring particle, it carried out by having repeated washing and filtration using hot water, and the coloring particle of yellow was fully washed.

[0123] and as the 0.5 weight section is comparatively alike and the dithiol system nickel complex (Mitsui Chemicals, Inc. make : SIR- 130) of the shape of a wet cake which is an infrared-absorption agent became to the coloring particle 100 weight section of this yellow, after making it distribute enough in ethanol, this was dried at 75 degrees C using the slurry dryer (the Nissin Food Products engineering company make : dace spar coat), and the front face of the toner particle of yellow was made to fix the above-mentioned infrared-absorption agent

[0124] Then, the toner particle 100 weight section of the yellow which the infrared-absorption agent fixed on the front face in this way is received. The 0.5 weight section and a hydrophobic silica (product made from Japanese Aerosil : AEROSIL 90 G) for a hydrophobic silica (Wacker make : H2000) The 1.0 weight section, After the mean particle diameter added the strontium titanate which is 0.2 micrometers at a rate of the 1.0 weight section and carried out mixed processing of these for 120 seconds by peripheral-speed 40 m/sec by the Henschel mixer, it trembled by the screen of 90 micrometers of openings, and the yellow toner Y8 was obtained.

[0125] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / yellow / Y8] 6.5 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.08 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.975 and circularity / 0.032.

[0126] (The cyano toner C5, MAZENDA toner M5) In manufacturing the cyano toner C5 and the MAZENDA toner M5 In manufacture of the above-mentioned yellow toner Y8, change the kind and amount of a coloring agent and it sets to the cyano toner C5. The wet cake-like C.I. PIKUMENTO blue 15-3 (Dainippon Ink make) is set to 5 weight sections and the MAZENDA toner M5. The cyano toner C5 and the MAZENDA toner M5 were manufactured like the case of the above-mentioned yellow toner Y8 except carrying out 4.5 weight sections use of the wet cake-like C.I. PIKUMEN tread 184 (Dainippon Ink make).

[0127] As shown in the following table 1, in addition, the cyano toner C5 For the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to 6.4 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv] Dv, 1.09 and the degree of mean-circle form is [the standard deviation (circularity SD) of 0.976 and circularity] 0.032. Moreover, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / MAZENDA / M5] 6.5 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.09 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.976 and circularity / 0.031.

[0128] (Transparent toner S1) In manufacturing the transparent toner S1 In manufacture of the above-mentioned yellow toner Y1, while making it not add a coloring agent the infrared luminescence fluorescence material of a white system which consists of Yb0.3 Y2.7 aluminum 5O12 as an infrared-absorption agent to the toner particle 100 weight section -- 1 weight ******** -- it was made like and the transparent toner S1 was obtained like the case of the above-mentioned yellow toner Y1 except it

[0129] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / transparent / S1] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.23 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.962 and circularity / 0.036.

[0130] (Black toner Bk1) In manufacturing the black toner Bk1 The same polyester system resin as the case of the above-mentioned yellow toner Y1 is used. As opposed to this polyester system resin 100 weight section carbon black (Cabot Corp. make : the mho gal L) 8 weight sections, The boron compound shown in the aforementioned formula (1) as an electrification control agent is made into the rate of 1 weight section. Melting kneading of these was carried out with the biaxial knockout kneading machine (Ikegai Corp. make-CM- 30), and after rolling out this kneading object in thickness of 2mm by the press roller and cooling with a cooling belt, coarse grinding of this was carried out with the feather mill.

[0131] Then, after the mechanical grinder's (Kawasaki Heavy Industries, Ltd. make's :'s KTM's) having ground this and grinding by the jet pulverizer (Japanese pneumatic industrial company make : IDS) further, it classified using the Rota type classifier (Hosokawa Micron CORP. make : tape Rex type classifier 100ATP), and 7.2 micrometers and the degree of mean-circle form obtained [the volume mean particle diameter / the standard deviation of 0.954 and circularity] the toner particle of the black set to 0.041.

[0132] Subsequently, after adding the hydrophobic silica (Wacker make : H2000) at a rate of the 0.5 weight section and mixing this for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer to the toner particle 100 weight section of this black, it processed for 3 minutes in 16400rpm by the hybridization system (the Nara machine factory company make : NHS- 0 type).

[0133] Then, after adding the strontium titanate the 0.5 weight section and whose mean particle diameter are 0.2 micrometers in a hydrophobic silica (Wacker make : H2000) about the 0.2 weight section and titanium oxide (Titan Kogyo K.K. make : STT30A) at a rate of the 1.0 weight section and carrying out mixed processing of these for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer to this toner particle 100 weight section, it trembled by the screen of 90 micrometers of openings, and the black toner Bk1 was obtained.

[0134] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / black / Bk1 / this] 7.2 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.24 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.954 and circularity / 0.040.

[0135] (Black toner Bk2) In manufacturing the black toner Bk2 In manufacture of the above-mentioned black toner Bk1, the toner particle 100 weight section of the above-mentioned black is received. A hydrophobic silica (Wacker make : H2000) is added at a rate of the 0.5 weight section. After mixing this for 60 seconds by peripheral-speed 40 m/sec by the Henschel mixer, It replaced with the above-mentioned hybridization system, and heat-treated at the moment at the temperature of 280 degrees C using the Sir fusing system 3 type (Japanese pneumatic industrial company make), and the black toner Bk2 was manufactured like the case of the above-mentioned black toner Bk1 except it.

[0136] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / black / Bk2 / this] 7.3 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.20 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.985 and circularity / 0.034.

[0137] (Black toner Bk3) In manufacturing the black toner Bk3 In obtaining the toner particle of black in manufacture of the above-mentioned black toner Bk1 The kneading object which carried out melting kneading with the above-mentioned biaxial knockout kneading machine (Ikegai Corp. make-CM- 30) is rolled out in thickness of 2mm by the press roller. The ** which does not grind this kneading object with a mechanical grinder (Kawasaki Heavy Industries, Ltd. make : KTM) after cooling with a cooling belt and carrying out coarse grinding with a feather mill, After grinding by the jet pulverizer (Japanese pneumatic industrial company make : IDS) immediately, it classifies using an elbow jet type classifier (Japanese ironworker business company make : EJ- 0 type). The toner particle of black was obtained and the black toner Bk3 was manufactured like the case of the above-mentioned black toner Bk1 except it.

[0138] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / black / Bk3 / this] 7.4 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.25 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.953 and circularity / 0.040.

[0139] (Black toner Bk4) if in charge of manufacturing the black toner Bk4 -- manufacture of the above-mentioned yellow toner Y7 -- setting -- a yellow coloring agent -- replacing with -- carbon black (Cabot Corp. make : the mho gal L) -- **** for 8 weight sections -- while making it like, it is made not to make the front face of a toner particle fix an infrared-absorption agent, and the toner particle of black was obtained like the case of the yellow toner Y7 except it

[0140] And after adding the strontium titanate the 1.0 weight section and whose mean particle diameter are 0.2 micrometers in a hydrophobic silica (Wacker make : H2000) about the 0.5 weight section and a hydrophobic silica (product made from Japanese Aerosil : AEROSIL 90 G) at a rate of the 1.0 weight section and carrying out mixed processing of these for 120 seconds by peripheral-speed 40 m/sec by the Henschel mixer to the toner particle 100 weight section of this black, it trembled by the screen of 90 micrometers of openings, and the black toner Bk4 was obtained

[0141] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / black / Bk4] 7.1 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.21 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.987 and circularity / 0.034.

[0142] (Black toner Bk5) In manufacturing the black toner Bk5 Styrene in the reactor made from the stainless steel whose capacity is 100l. The 0.1 weight section, The 0.1 weight section and a methacrylic acid The 0.1 weight section, [n-butyl acrylate] It taught so that sodium dodecylbenzenesulfonate which is an emulsifier might become the 0.08 weight section and ion exchange water might become the rate of the 300 weight sections, this was heated at 75 degrees C, 0.05 weight section addition of the potassium persulfate was carried out, it applied to this in 1 hour, the polymerization was performed, and the water dispersion of a latex was obtained.

[0143] Furthermore, as the potassium persulfate the 77.7 weight sections and whose n-butyl acrylate are the 22.0 weight sections and a polymerization initiator became the rate of the 0.3 weight section, it added continuously, having applied these to the above-mentioned latex water dispersion in 4 hours, and the polymerization was performed, and styrene obtained the polymer particle from which the mean particle diameter was set to 0.15 micrometers.

[0144] The polymer particle whose above-mentioned mean particle diameter is 0.15 micrometers And the 186 weight sections, 8 weight sections and a wax (Sanyo Chemical Industries, Ltd. make : low-molecular-weight-polypropylene

660 P) 5 weight sections, [carbon black (Cabot Corp. make : the mho gal L)] The electrification control agent (Hodogaya Chemical Co., Ltd. make : T-77) of an iron complex system 1 weight section, It is made for ion exchange water to become the rate of the 320 weight sections, and it heated at 25 degrees C, agitating this mixture using TK auto gay mixer (special opportunity-ized industrial company make), after mixing for 30 minutes with an ultrasonic homogenizer, and the dispersion liquid of the aggregated particle from which the particle diameter was set to 1.2 micrometers were obtained.

[0145] Subsequently, after it heated to 60 degrees C after agitating the dispersion liquid of the above-mentioned aggregated particle for about 2 hours, and ammonia adjusted to pH 7.0, these dispersion liquid were heated to 90 more degrees C, and it agitated for 2 hours, and after obtaining the dispersion liquid of the coloring particle of the black with which the mean particle diameter was set to 6.5 micrometers and separating this coloring particle, it carried out by having repeated washing and filtration using hot water, and the coloring particle of black was fully washed.

[0146] And after adding the strontium titanate the 1.0 weight section and whose mean particle diameter are 0.2 micrometers in a hydrophobic silica (Wacker make : H2000) about the 0.5 weight section and a hydrophobic silica (product made from Japanese Aerosil : AEROSIL 90 G) at a rate of the 1.0 weight section and carrying out mixed processing of these for 120 seconds by peripheral-speed 40 m/sec by the Henschel mixer to the coloring particle 100 weight section of this black, it trembled by the screen of 90 micrometers of openings, and the black toner Bk5 was obtained

[0147] In addition, as shown in the following table 1, for the ratio (Dv/Dp) of the volume mean particle diameter [as opposed to / toner / black / Bk5 / this] 6.4 micrometers and the number mean particle diameter Dp in the volume mean particle diameter Dv / Dv, 1.09 and the degree of mean-circle form was / the standard deviation (circularity SD) of 0.977 and circularity / 0.032.

[0148] Next, while mixing with the binder type carrier each toner obtained as mentioned above and calculating the amount of electrifications of each toner, the experiment which calculates the amount of the poor electrification toner of low electrification or reverse electrification was conducted.

[0149] In obtaining the above-mentioned binder type carrier here A polyester system resin (Kao Corp. make : NE-1110) The 100 weight sections, Are made a magnetic particle (Toda Kogyo Corp. make : magnetite EPT- 1000) into the 700 weight sections, and carbon black (Cabot Corp. make : the mho gal L) is made into the rate of 2 weight sections. These were enough mixed by the Henschel mixer and melting kneading of this mixture was carried out with the 2 shaft extrusion kneading machine which set the temperature of 180 degrees C and the cylinder head section as 170 degrees C for the temperature of a cylinder part. And after making this kneading object cool, coarse grinding was carried out with the hammer mill, it pulverized by the jet pulverizer, and the binder type carrier with which this was classified and the volume mean particle diameter was set to 40 micrometers was obtained.

[0150] In addition, the volume mean particle diameter of this binder type carrier was measured using the 150-micrometer aperture tube using the coal tar multi-sizer II (Coulter-counter company make).

[0151] And it is E-Spart, while mixing the developer which prepared each developer as the toner weight ratio became 7% of the weight, respectively about each above-mentioned toner and this above-mentioned binder type carrier, and was prepared in this way for 30 minutes, respectively and measuring the amount of electrifications of each toner in each developer by the electric-field separation method. The amount of the poor electrification toner of low electrification or reverse electrification was calculated by Analyzer, and the result was shown in the following table 1. In addition, about the amount of a poor electrification toner, the amount of electrifications asked for the number of the toners by the side of plus from -1 (femt-C/mum), it is O about the case where this number of toners is less than 1%, and it is ** about 1 - 3% of case, and x showed the case where 3% was exceeded.

[0152]

[Table 1]

トナーの種類	赤外 吸収剤量（重量部）	Ｄｖ（μｍ）	Dv/DP	平均円形度	円形度ＳＤ	帯電量(μC/g)	不良帯電トナー
Ｙ１	０．５	７．３	1.24	0.962	0.036	-20.3	○
Ｙ２	０．２	７．２	1.23	0.961	0.036	-19.2	○
Ｙ３	０．８	７．２	1.22	0.962	0.035	-20.4	○
Ｙ４	１．２	７．２	1.23	0.961	0.036	-20.3	○
Ｙ５	０．５	７．２	1.18	0.976	0.033	-21.3	○
Ｙ６	０．５	７．２	1.25	0.955	0.039	-19.1	○
Ｙ７	０．５	７．０	1.19	0.988	0.032	-22.1	○
Ｙ８	０．５	６．５	1.08	0.975	0.032	-23.2	○
Ｃ１	０．５	７．２	1.23	0.961	0.036	-20.8	○
Ｃ２	０．５	７．１	1.17	0.975	0.032	-21.5	○
Ｃ３	０．５	７．３	1.24	0.955	0.038	-19.2	○
Ｃ４	０．５	６．９	1.18	0.989	0.031	-21.9	○
Ｃ５	０．５	６．４	1.09	0.976	0.032	-23.1	○
Ｍ１	０．５	７．２	1.24	0.962	0.036	-20.0	○
Ｍ２	０．５	７．１	1.17	0.975	0.033	-21.0	○
Ｍ３	０．５	７．３	1.24	0.955	0.039	-18.8	○
Ｍ４	０．５	７．０	1.18	0.988	0.032	-21.2	○
Ｍ５	０．５	６．５	1.09	0.976	0.031	-23.0	○
Ｓ１	1	７．２	1.23	0.962	0.036	-20.1	○
y①	0	７．６	1.27	0.954	0.041	-14.6	×
c①	0	７．７	1.28	0.953	0.041	-15.2	×
m①	0	７．７	1.28	0.954	0.042	-13.2	×
y②	2	７．２	1.23	0.960	0.038	-19.1	○
c②	2	７．３	1.24	0.959	0.038	-19.8	○
m②	2	７．３	1.24	0.961	0.037	-18.6	○
y③	０．５＊	７．３	1.31	0.942	0.043	-15.4	△
c③	０．５＊	６．２	1.30	0.958	0.040	-15.2	△
m③	０．５＊	６．２	1.29	0.961	0.040	-14.8	△
Ｂｋ１	0	７．２	1.24	0.954	0.040	-18.9	○
Ｂｋ２	0	７．３	1.20	0.985	0.034	-19.2	○
Ｂｋ３	0	７．４	1.25	0.953	0.040	-17.9	○
Ｂｋ４	0	７．１	1.21	0.987	0.034	-21.3	○
Ｂｋ５	0	６．４	1.09	0.977	0.032	-21.4	○

＊はトナーの内部に添加した量

[0153] Consequently, while the amount of electrifications of a toner became low in making the front face of a toner particle fix an infrared-absorption agent in yellow toner y** which made the amount of the infrared-absorption agent to the toner particle 100 weight section 2 weight sections, cyano toner c**, and MAZENDA toner m**, the amount of toners of low electrification and reverse electrification had increased.

[0154] Moreover, each developer which each toner and the binder type carrier were prepared [developer] so that a toner weight ratio might become 7% of the weight, respectively, and mixed them for 30 minutes as mentioned above It is used for unit 10Bk, and 10C, 10M, 10Y and 10S. the object for image formation to which the full color image formation equipment which combines as shown in the following table 2, and is shown in aforementioned drawing 1 corresponds -- Each toner is supplied from Bk, and 10C, 10M, 10Y and 10S one by one on the unit 10 record medium 1 for each image formation. They are about 4 J/cm2 from above flash plate fixing equipment 20 to each toner image which formed each toner image and was formed in this way. Infrared radiation is made to irradiate, each toner image is fixed to a record medium 1, and the picture was formed on the record medium 1.

[0155] In addition, toner coating weight total when piling up the toner of four colors in forming the picture which piled up two or more toners on a record medium 1 as mentioned above is 12 g/m2. Toner coating weight total when piling up the toner of five colors so that it may become and is 15 g/m2. It was made to become.

[0156] And about each picture which did in this way and was formed on the record medium 1, the fixing nature of a toner, fogging, dot repeatability, and thin-line repeatability were investigated, and the result was shown in the following table 2.

[0157] It asked for the picture concentration Io before rubbing the picture acquired about fixing nature here with a sand rubber, and the picture concentration Is after rubbing, and asked for fixing intensity by the following formula, and it is O about the case where this fixing intensity is 90% or more, and it is O in less than 90% of 80% or more of cases, and is ** in less than 80% of 70% or more of cases, and x showed less than 70% of case. In addition, about yellow toner y** which has not added the infrared-absorption agent, fixing intensity was very low, and since the picture separated and fell only by grinding by hand, the following evaluations were not performed.
[0158] Fixing on-the-strength =(Is/Io) x100[0159] Moreover, about fogging, dot repeatability, and thin-line repeatability, x showed the case where are O, and were ** and it became a problem practically about the case where picture quality is excellent, in the case of the level which is satisfactory practically.
[0160] Moreover, only the yellow toner shown in Table 2 in above full color image formation equipment is supplied on a record medium 1, and toner coating weight is 5 g/m2. The toner image of the yellow monochrome which became was formed, and although there was color muddiness of some by O about the case where color-reproduction nature is good, x showed the case where color muddiness was large and there was a problem practically by ** about the case where it is satisfactory practically.
[0161]
[Table 2]

トナーの種類					定着性	色再現性	カブリ	ドット再現性	細線再現性
イエロー	マゼンダ	シアン	ブラック	透明					
Y1	M1	C1	Bk1	−	◎	○	○	○	○
Y5	M2	C2	Bk2	−	○	○	○	○	○
Y6	M3	C3	Bk3	−	○	○	○	○	○
Y2	M1	C1	Bk1	−	○	○	○	○	○
Y3	M1	C1	Bk1	−	◎	○	○	○	○
Y4	M1	C1	Bk1	−	◎	△	○	○	○
Y7	M4	C4	Bk4	−	◎	○	○	○	○
Y8	M5	C5	Bk5	−	◎	○	○	○	○
Y1	M1	C1	Bk1	S1	○	○	○	○	○
y①	m①	c①	Bk1	−	×	−	−	−	−
y②	m②	c②	Bk1	−	◎	×	×	×	×
y③	m③	c③	Bk1	−	×	○	○	○	○

[0162] As opposed to the toner particle 100 weight section an infrared-absorption agent consequently, in the range of the 0.1 - 1.5 weight section When the yellow toner which the front face of a toner particle was made to fix, a cyano toner, and a MAZENDA toner are used When a toner is supplied to a record medium in piles, while a record medium fully comes to be fixed to these toners by flash plate fixing equipment The picture which is satisfactory practically in the point of fogging, dot repeatability, and thin-line repeatability is not acquired, and the repeatability of the color in the picture formed further did not necessarily become bad.
[0163]
[Effect of the Invention] In the toner [in / this invention / as explained in full detail above] for non-contact heating fixing Since it was made to make the front face of a toner particle fix an infrared-absorption agent, in the front face of a toner particle, an infrared-absorption agent comes to absorb infrared radiation efficiently. Even if the absorption efficiency of the infrared radiation in this toner for non-contact heating fixing improves and it makes the amount of an infrared-absorption agent into an amount with little range of the 0.1 - 1.5 weight section to the toner particle 100 weight section A record medium fully came to be fixed to this toner for non-contact heating fixing by non-contact heating fixing equipment.

[0164] Moreover, while writing the amount of the infrared-absorption agent which makes the front face of a toner particle fix few in the toner for non-contact heating fixing in this invention and reducing the manufacturing cost of a toner, it is suppressed that properties, such as an electrification performance in a toner, fall, it decreases that the color of a color toner changes with infrared-absorption agents further, and the color picture excellent in the repeatability of a color came to be obtained.

[Translation done.]

* NOTICES *

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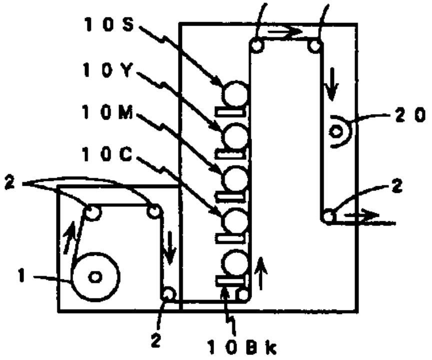
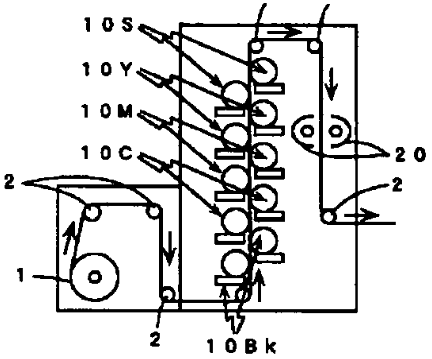
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]